SEPTEMBER 1934 ● VOL. III · NO. 5

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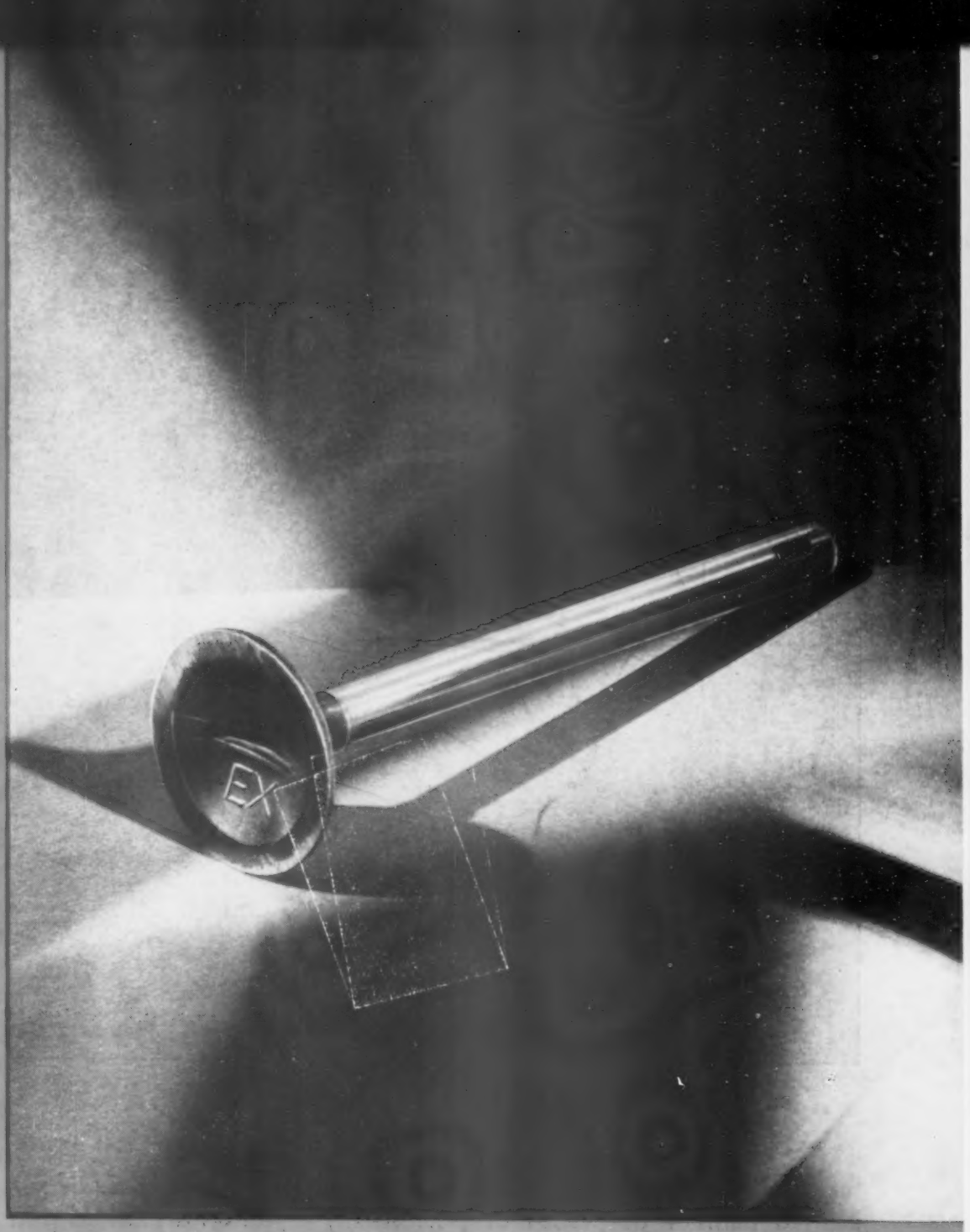
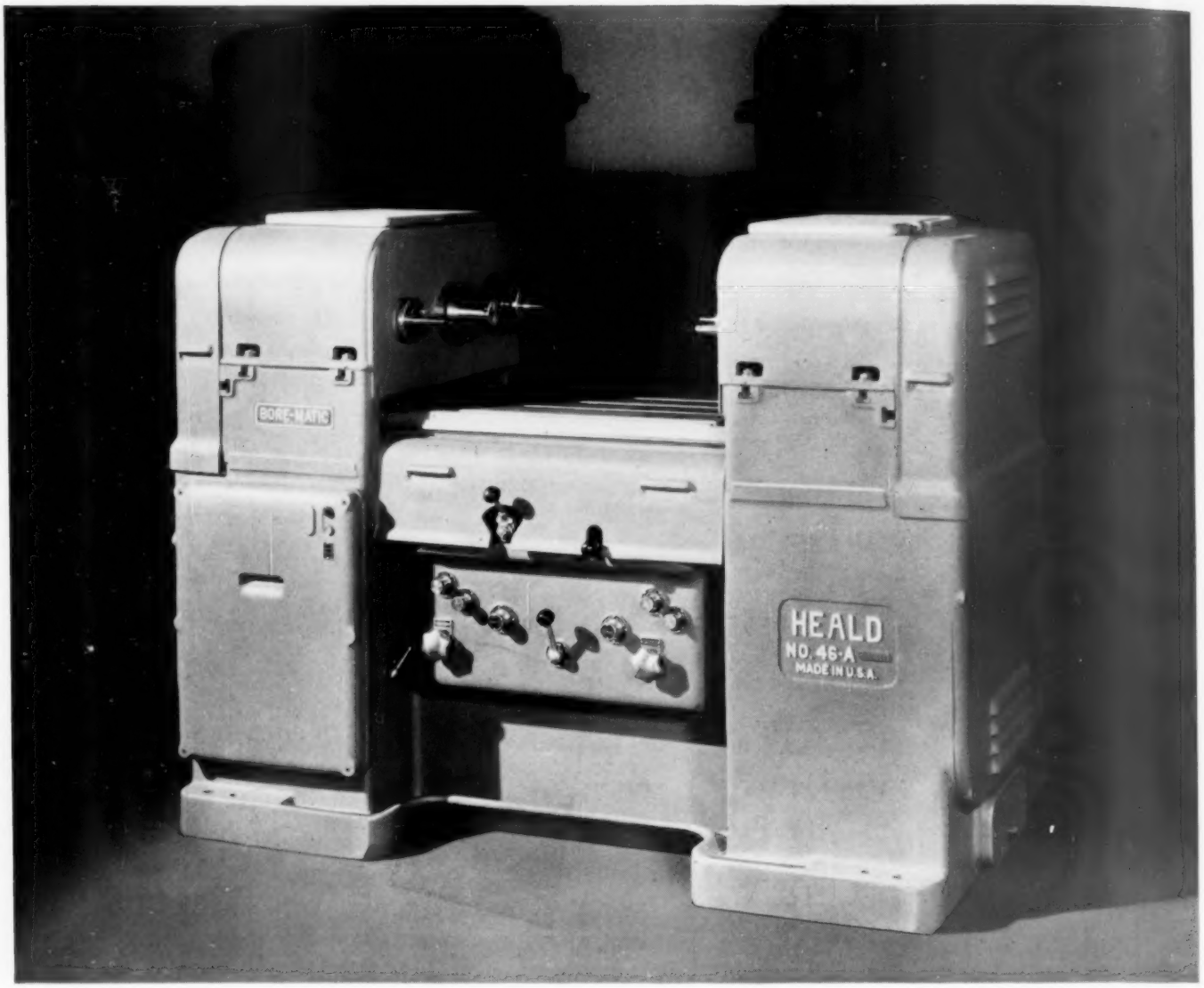


Prize winner of recent photographic exhibition—showing valve produced by extrusion. ***See page 17 for details.***

The A.S.T.E. Journal

Official Publication of the

AMERICAN SOCIETY OF TOOL ENGINEERS



NEW—A double end Heald Style No. 46A Bore-Matic Precision Boring Machine. Built especially for mass production, borizing a number of pieces or performing several operations on one piece all at the same setting.

This machine of unusual sturdy, rugged construction, weighing 10,000 lbs. and equipped with vibration dampeners for motor and pump, together with multiple V belt drives and unexcelled workmanship throughout, has reduced vibration to a minimum.

Generous size bridges give ample room for four boring heads on each end, and the distance between the bridges of 33" permits plenty of room for fixtures mounted on a finished pad on the table. While not standard, machines can be furnished with 42" between bridges.

The design of the control box is particularly ingenious as it is built up of several units readily changeable for various cycles without disturbing any of the piping.

There are scores of features combined in this machine for every convenience in giving fast, successful operation. Write for descriptive bulletin.

THE HEALD MACHINE COMPANY, Worcester, Mass., U. S. A.

The A.S.T.E. Journal

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AMERICAN SOCIETY OF TOOL ENGINEERS

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INFORMATION PERTAINING TO MEMBERSHIP IN THE AMERICAN SOCIETY OF TOOL ENGINEERS may be had by addressing the Secretary's office. All matters relative to the Society should also be addressed to the Secretary's office—8316 Woodward Avenue, Detroit, Michigan, Telephone Madison 2057.

BE SURE TO READ IN THIS ISSUE

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SEPTEMBER MEETING

(Detroit)

Hotel Fort Shelby Ballroom

September 13th (Thursday)

8:00 p. m.

 **"Give and Take" (Conference) Meeting** 

Speakers		Subjects
B. L. Diamond	Ternstedt Manufacturing Company	Design of Fixtures for use on Projection Welding Machines.
W. Maxwell Gray	Congress Tool and Die Company	The Automobile of the Future.
O. B. Jones	Detroit College of Applied Science	Engineering Design Principles Simply Applied to Tool Engineering.
F. R. Lamb	Consolidated Machine Tool Corporation	Screw Threads.
W. H. Smila	Chrysler Corporation	Weight Control of Connecting Rods.
R. M. Lippard	Heald Machine Company	Processing Connecting Rods to be used with Steel Backed Bearings. (Sequel to Mr. Smila's Talk.)

This meeting of members and friends on September 13th at the Fort Shelby Hotel in Detroit, will be in the nature of a conference to discuss each of the above subjects. Each speaker has been allotted fifteen minutes, after which the meeting will be thrown open for discussion.

Everyone is invited to come prepared to enter this round-table discussion under the guidance of the speakers. Bring your questions to this meeting—if the speakers cannot answer them, perhaps other members present can.

The speakers are well known by most men in Detroit and vicinity and need no introduction. They have been "knocked and battered" so much in the past twenty years in their contacts with machines, men and methods that they have long since lost their boyish conceit, and can "grin and bear it"—so come prepared to ask 'em and tell 'em. This meeting should be one of the most interesting and educational meetings we have yet enjoyed.

Your Chairman of Meetings plans to continue this type of meeting, alternating it with a dinner and entertainment meeting. That is, a round-table or conference meeting will be held one month, while the next month will have a dinner meeting and variety program with a lecture on some subject somewhat out of the daily routine of the tool engineer's work-a-day world.

 ***Post Nubulus Phoebus*** **(Liberal translation) "Refreshments after the meeting."** 

(Refreshments are free)

EVOLUTION OF ORGANIZATION

by JOHN YOUNGER

"Just as there is competition, at times, for the individual of superior ability so there is competition for successful organization." Executive Engineers who have felt the unmistakable certainty of this fact will appreciate this series by John Younger, well known to many A. S. T. E. members. Readers are urged to save this series, which will virtually constitute a text book on "Human Engineering."

PROBABLY some form of organization has existed in human work since the building of the Tower of Babel which failed, by the way, due to lack of organization, although the thought of it was present. Unquestionably Solomon's temple and the pyramids of Egypt were built under organization methods. There were groups of slaves with overseers or foremen—there were the great lords, the superintendents and managers, and in the procurement of straw for the Israelites' brick making there is a hint of the presence of a purchasing agent.

By organization is meant "the structure of the enterprise especially from the standpoint of the duties and functions of the parts thereof." The purpose of an organization is to provide for a daily routine and effective operation of a business with a minimum of direction from above.

Possibly the earliest organizations we know much about were military in character, and were distinguished by the fact that there was a single leader in charge toward whom all men looked. This type of organization persists today not only in our military work but in some of our small industries. This phase we will discuss later. However, let us consider industrial organization. Man started as an individual worker supplying only his own needs by his own labor. One finds survivals of this among very primitive people but the next stage is rapidly reached. One man finds himself rather better than his fellows in doing some piece of work—let us say making arrow heads, so what is more natural than to have the others approach him with the proposition that he should make his superior arrow heads for them also. We saw this feature develop in our own pioneer days in this country where the early settlers started out by working individually for themselves and then found one of their number a superior blacksmith or wagon builder, and so set him up in the business to supply all needs. Sometimes this worker worked in his own cottage but a later step was to set up a little establishment—the foundation of our modern factory—to do his work in. Thence he would proceed at daybreak and return at dusk. Incidentally, this phase marked the beginning of the expert.

Then came the banding of these handicraft workers, as they were called, into groups for the interchange of knowledge, marking the beginning of the guilds or trade associations—later trade unions of the craft. Bevenute Cellini's autobiography gives an interesting sidelight on the methods of the guilds of those days. Then came the beginning of the "boss" or master worker, usually a highly competent craftsman himself who gave out work to his colleagues or assistants, which work was usually performed in the home, alternating with the common work of farming for their food necessities.

There are still survivals of this phase in a few of our local communities. Elbert Hubbard of East Aurora practiced it in his village for some time with success.

The next step, and we find this one taking place about the sixteenth century, was to group all the workers in one place. We now have the actual beginning of the factory with its organization.

Naturally progress in those days was slow. Transportation was so poor that, as we saw in the case of our table maker, everything was done locally. There were few big cities and there were no large aggregations of men as we have today.

Organization was of the simplest form, being represented by the individual orders and contact with the master worker who knew each of his men and knew all of his family connections. These orders were by word of mouth. Possibly a sketch or a model accompanied the order, but correspondence and blueprints, as we know them today, were totally unknown. Yet these early workers did splendid work. In the field of architecture they built marvellous cathedrals which still exist to the credit of their creators. They were able to make satisfactory homespun clothes, and had good wholesome food, but of course living was on a very simple plane with few luxuries.

The present day factory system with its tremend-

The Tower of Babel failed because of a lack of organization, while Solomon's Temple was finished under organization methods.

our organization did not come until the birth of Hargreave's "Spinning-jenny" around 1770 and of Arkwright's improvements a few years later. The invention of the steam engine by James Watt completed the revolution that was taking place, as it substituted mechanical power for manual labor. It also substituted mechanical transport for the ox cart and the horse devices, and Stephenson with his steam locomotive and railroad equipment opened the way for national boundaries rather than local boundaries.

"Organization is necessary to transmit the ideas of executives into practical finished products of the workmen."

Manufacturing then began to grow apace and soon we had large aggregations of workers all engaged on a common task of completing a particular product or series of products.

Today's companies employing 100,000 or more men are not uncommon and the organization that has been set up to convey the ideas of the president or general manager is at first sight very complicated and on close scrutiny is found very thorough.

We have developed the American type of mass production, standardization, interchangeable parts system which has revolutionized manufacturing. We have elaborate complicated machines and machine tools. We have made tremendous changes in man's status.

Organization Today

Organization is necessary, as we have mentioned, to transmit the ideas or thoughts of certain people, usually called executives, into the practical finished product made by the workmen. We stated "of certain people" differentiating this number from the single man or "boss" who used to run his business somewhat as an autocrat does. We only see the boss survive today in very small industries which can be controlled by one man. His place has been taken in our larger industries by a series of men called executives. Each of these executives has a particular function which he is given authority to control. He is, hence, at times called a functionalized executive and the organization is called a functional organization. This is the type of organization we have evolved into, and it seems to serve its purpose very well; it seems difficult to improve on it.

It is based of course on the fact that there are limitations to the capacities of a man's brain however superior in intellect he is and with today's ramifications it is necessary for him to amplify his brain by introducing other brains of more or less ability to aid him in his purpose of controlling his industry.

Yet at the same time we have the governing head—the president or general manager still retained. He is a man who combines the ability to lead all functions, directing them and harmonizing them. He is somewhat like the escapement wheel of a watch setting the rhythm for all the gears, but perhaps a better illustration is that he is leader of the industrial orchestra.

Let us digress a minute and consider an orchestra, as it has a pertinent bearing on the matter. Its functionalized executives, if we may call them such, are such men as the first violinist, the first cellist, the trombone player, the trompanum player, and so on. Each man in a leading position is perfect in his own art. Each of these men may be a notable in his own branch of music. Each may be far better than any other man, yet we find it necessary to have a conductor. Why have a conductor who seemingly contributes nothing to the volume of music?

It was the writer's good fortune to attend a rehearsal of the Detroit Symphony Orchestra. To my unpracticed ear the music was delightful, but to Mr. Stokovski (the conductor) it was lacking something at times that failed to contribute to the finished product—a superb symphony. He would hold up his hand and stop the orchestra. "Mr. first violin," he would say, "you are playing a little fast," or "Mr. trombonist you are a trifle slow in coming in on your measure," or perhaps someone was a shade loud or too soft, and so he affected the individual playing in terms of harmony or speed or tempo and in terms of tone and volume.

And so we find our general manager today performing a similar function. He has under him executives who can exercise their functions in a fashion far superior to his own, but he directs them towards harmony of the complete organization. One of these executives, the designing engineer, often called, though at times wrongfully, the chief engineer, may be and often is a brilliant designer—an excellent engineer. Yet he has to be kept in step with the production department which has to produce his products, and with the sales department which has to sell them. It is little good, designing a wonderful project, if it cannot be sold. Hence these three departments must be correlated and the general manager performs this function.

Or again to emphasize the point another functional executive, the purchasing agent, may make a splendid purchase. Correct as regards quantity and quality, but it may be delayed as regards time, and production may suffer and men may be laid off from employment due to delay. It is the function of the general manager to co-ordinate the work of purchasing and production so that the time element is observed.

The functional executives reporting directly to the general manager and responsible for the control of their own departments are usually as follows:

A director of design engineering responsible for the initiation of design (at suggestion perhaps of

(Continued on page 10.)

RECENT PATENT GRANTS OF INTEREST TO THE TOOL ENGINEER

By WILLIAM J. BOYD
Washington Correspondent, The A.S.T.E. Journal

Milling and Like Cutting Tool

The U. S. Patent Office has granted patent No. 1,964,130 to Ralph Miller of Birmingham, England, for an invention which relates to milling and like cutting tools of the inserted tooth type, which has for its object the devising of simple and effective means for securing the teeth or cutters to the tool holder or equivalent part, which permits of adjustment of the tooth or cutter in relation to the tooth holders, as may be required to compensate for wear.

According to the invention, the tooth or cutter is secured with a pocket or recess in the tool holder or equivalent part by means of a metal wedge plate, secured against movement in the pocket or recess.

Machine for Cutting Screw Threads

A patent, No. 1,965,035, was granted last week by the U. S. Patent Office to Herman Godziewski, of Germany, relative to a machine for cutting screw threads, which operates on a forward and backward plan.

Such machines are known to compensate for the play arising from the return movement of the cooperating parts of the driving mechanism in such a way that the carrier is arranged to be movable within limits between adjustable stops provided on a driver member.

Such a device has, however, exhibited various defects. The object of this invention is to remove these defects. Accordingly this invention compensates for the play between the cooperating parts of the driving mechanism is effected by introducing such a pre-determined amount of artificial play in an axial bearing of the spindle which transmits the longitudinal movement to the work or work-support is delayed until the work, taking into account the inherent lost motion of the driving mechanism, has made one or more complete revolutions.

Machine Tool

Leo A. Dunser and Clement J. Schroder, of Rockford, Ill., have been granted a patent for an invention which relates generally to machine tools, and more generally to an automatic machine wherein work pieces or blanks are chucked, finished and ejected automatically.

The general object of this machine is to provide a new and improved machine tool embodying a work holder together with automatic measure for holding a work piece onto the holder for finishing the work piece, while so mounted, and for finishing the work piece.

Another object of this invention is to provide an improved automatic lathe of this character wherein the work pieces, placed in a hopper by an operator, are then chuckled, finished and ejected automatically without any further effort on the part of the operator.

This invention also provides a novel measure for receiving the finished work pieces.

Tool Holder

Henry E. Martin, of Muskegon Heights, Michigan, has been granted a patent for an invention which relates to a cutting tool or bit holder for metal working machines, and more particularly for heavy duty machines of the draw or push cut type, wherein the tool is carried by a heavy reciprocal member.

The object of this invention is to provide a tool holder applicable to the reciprocal member of such a machine, which holder, when secure in place, is non-vibrating, and becomes as rigid as the reciprocal member itself. The new patent also provides a holder which may be readily and quickly detached, and from which holder the cutting tool or bit may be readily removed without detaching the holder for the purpose of sharpening or replacing the tool.

A further object is to provide means on the holder for accurately setting the tool, together with adjustable means for accurately gauging the tool.

An additional object of this invention is to provide simple and quick operable means on the holder for rigidly seating and firmly holding the tool or bit in the holder.

Impact Tool

Harry C. Hayes, of Washington, D. C., has been granted a patent for an impact Tool, which invention relates to actuating means for impact tools.

The main object of this invention is to transform electrical energy into vibratory mechanical energy more efficiently than has been done by tool machines heretofore.

Another object of this invention is to provide impact tools that will do more accurate work than tool devices of this nature.

Another object of this invention is to reduce to a minimum the irritating effect of such devices upon persons in the vicinity of their operation, by causing the blows to be delivered at a frequency above the range of irritability through either touch or hearing.

NEWS NOTES OF INTEREST TO THE TOOL ENGINEER

Word has been received from Williamsport, Pennsylvania that **William Barge,** of the Lycoming Manufacturing Company has been made **Master Mechanic.**

New Chevrolet Plant. Recent announcement has been made of a new assembly plant, which will have an annual capacity of more than 75,000 cars and trucks, to be erected in Baltimore. It is understood a Fisher body plant may also be erected on the same site.

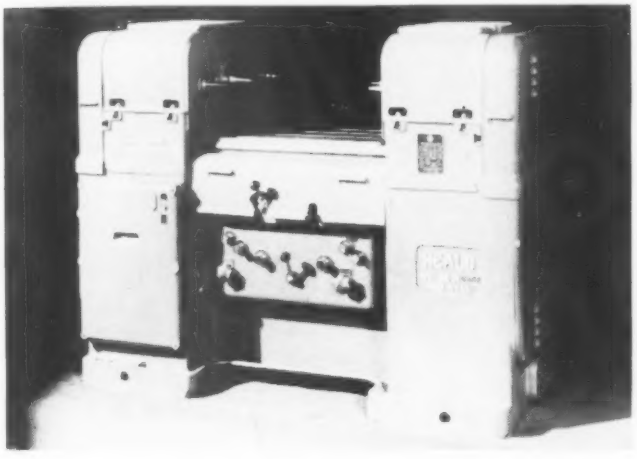
Hal Giller, A.S.T.E. Member, is the proud father of a new daughter born August 8th.

Heald Announces New Double End "Bore-Matic" for Mass Production

A entirely new double end "Bore-Matic" Precision Boring Machine, is now announced by The Heald Machine Company of Worcester, Mass. This new machine replaces the previous Heald double end machine and any others that Heald has built. It is thought to be the heaviest precision boring machine built and is especially designed for mass production of either a single piece or a number of pieces which are to be bored in one set-up.

The size of the new machine, to be known as No. 46A, with its large oil reservoir spread over the entire lower portion of the base, rapidly dissipates, through the extensive wall surfaces heat obtained from the oil and which might affect operation through temperature changes.

Particular attention has been paid to the hydraulic control box which is built up of separate units readily changeable for various functions without disturbing any of the piping.



The New Heald 46 A Double End Precision "Bore-Matic"—heaviest machine of its type built, suitable especially for mass production of single piece or a number of pieces to be bored in same set-up.

The base is a massive, well ribbed casting weighing 4600 lbs. It rests on three generous pads with both lag and leveling screw holes provided at these three points. The lower portion of the base is used as an oil reservoir and extends over the entire base, giving a maximum radiation of heat.

Electrical Controls. All electrical controls including fusible disconnect switch are mounted in one common cabinet cast in left end of base, with aluminum cover interlocked with switch.

The table is a 1000-lb. casting with flat and V ways accurately scraped to match the ways on the table. The top of the table is of tray design confining the lubricant and borings within its limits. A finished pad in the center, having three longitudinal Tee slots provides for mounting and clamping the work fixtures in place. A drain spout at the rear of the table carries the lubricant and chips to a chip tray.

The bridge and boring head drive. Multiple V belts drive the boring heads from the clutch and

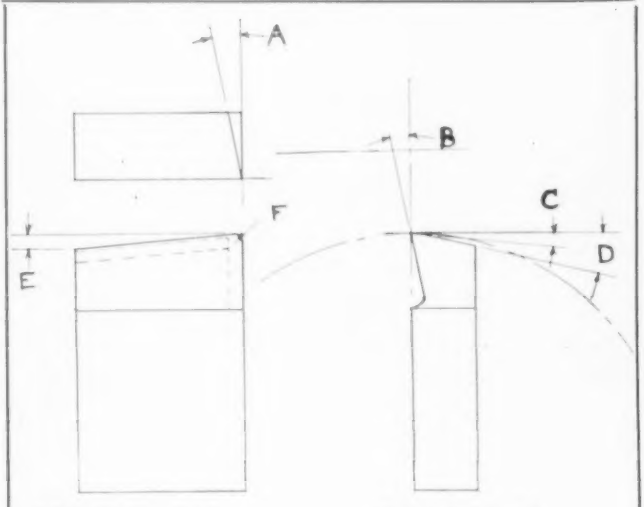
(*Continued on page* 13.)

Chart For Boring Cutter Grinding

By CHAS. F. STAPLES*

The following information is based on accumulated experience involving a number of different applications—all of which have been successful. However, it is not offered as an infallible rule, but is suggested as a good starting point. Conditions alter cases and it may be necessary to vary angles to suit some installations.

See Figure 1, below. Angles A, B and C are equal and for various metals are as follows:



Mall. Iron 6°	**Cast Iron 5°**
Cold Rolled 10°	**Forged Steel 8°**
Cast Steel 8°	**Brass 15°**
Bronze (hard) 7°-9°	**Aluminum 15°-20°**
Alloy Steel 8°	

Note:—Whenever it is practical to build new cutters of Tungsten-Carbide, cutting angle may be about one-half of what the above chart shows.

Angle D, in the figure above, is made to suit conditions and should be as small as possible with just enough clearance for the hole being bored. The radius F is about 1/32" and may be honed. This will give a high finish, however, where finish is not important a 45° angle can be used. Back taper E varies with the amount of stock to be removed and is usually .001 to .002.

Cutters for use on cast or malleable iron should have a 1/64" to 1/32" land. For all other materials listed no land is recommended, but cutters will give longer life and more satisfactory service with .005 to .010 land.

*Member A.S.T.E.

YOUR EDITOR SPEAKS

"Are tool engineers and master mechanics very busy these days?" asked the visitor in my office yesterday. You all know the answer. He was told that they are and that he needn't ever wonder about that again in the future.

He was not intimately acquainted with the inner life of the tool engineer so it was explained to him that in every plant in America that is destined to succeed in rendering a profit to its stockholders, tool engineers have been going over stacks of blueprints and analyzing plant layouts and tool line-ups, compiling, comparing and paring production costs throughout the long years of the recent depression.

Many times the plant has been completely retooled and rearranged on paper and costed to produce a new model which was never released for production. Whether the plant is completely closed down or in full operation, the tool engineer is pressed, either by the management for estimates or the production division for the solution of manufacturing and processing difficulties.

The public is beginning to find out by means of the daily newspapers what has been taking place in the privy councils behind the factory gates. Headlines announce that Ford is doubling the power-generating facilities of his plant at a cost of $5,500,000; that Fishers are expending better than $3,000,000 for increasing their production possibilities; that steel mills are investing millions for new equipment to produce larger quantities; that telephone companies are laying out millions to take care of speedier communications essential to the carrying on of an awakened industry at a tempo never realized in the past; that railroads are to be speeded up to over a hundred miles an hour through the building of millions of dollars worth of streamlined air-conditioned passenger and freight carriers on new noiseless tracks with curves banked like the Indianapolis speedway; that homes by the thousands fabricated of fiber and metal are to be produced in mass-production plants; that air conditioning units for cooling the sweltering homes of citizens of the tropics and warming the dwellings of the inhabitants of the colder regions are to create an industry larger than the present automotive industry.

Every tool engineer knows of a program in his own plant calling for an investment of a hundred or so thousand dollars which can not yet be published, but which in their aggregate total a sum many times larger than the amount which has been inspiring headlines in the daily press.

Machine-tool builders say they have quoted on more business in the past six months than they have ever been privileged to in any six-month period in the past.

"Yes, dear friend, the tool engineers are busy and, this time, that's good news for everybody."

Abolish the United States Patent Office was the cry of a Congressman in the latter part of the nineteenth century,—"Because, said he, "everything possible has been patented." Yet we now learn that the facilities of this government agency are taxed to capacity during these depression years to take care of the flood of new inventions, which are now being prepared for the market by privately employed tool engineers. See page 8 of this *Journal* for some of the recent grants.

Evolution of Organization

(Continued from page 7.)

general manager or sales manager) and the carrying through of design to the ultimate blueprints and bills of materials.

A director of quality, responsible for the quality of material purchased, material processed, and for the finished product.

A director of materials responsible for the purchase of incoming commodities and materials and for their proper storage and insurance.

A director of manufacturing responsible for the manufacture of parts and their assembly into the finished product—responsible for the discipline of the workmen and for the wage compensation they receive.

A sales manager responsible for the distribution and sales and advertising of the products of the company.

A director of personnel, responsible for the hiring, firing, transferring, and promotion of the men—responsible to a large extent for the welfare work and the general morale of the plant.

A director of maintenance, sometimes called plant engineer, responsible for the upkeep of the plant and its equipment and often responsible for the power station and for the heating and lighting and ventilation systems.

Finally a comptroller who is responsible for the money or financial matters. He keeps the costs, makes out the statements, pays money and receives money, watches the various items that involve money and co-ordinates them with the money available.

Incidentally, let us discuss a moment the question of charts. One or two firms and one in particular does not believe in organization charts, but the majority of opinion is strongly in their favor and believe in having the chart set up in a prominent position so that the function of each man is clearly and generally known. The chart may be made up of a board or vertical platform on which is set L head screws at appropriate distances. Labels expressing the function and the man holding it are hung on these screw heads. Such a board preserves the functional set up and allows for ready changes in personnel.

There is one aspect of today's organization that may have been noticed. It concerns itself largely with the routine of today, and there is little provision made for the future. This provision is made by having so-called staff members whose duties are not executive but are advisory. For example, the General Electric Manager may have a staff attached to his office consisting of a research designer, a research production man, and a research distribution or sales man with accompanying assistants. Their duties are to evolve and project the product of five of ten years hence. To gage the trend of public taste and demand and find what can be manufactured and what can be sold. Sometimes these staffs are attached to the functionalized executives, as, for example, where the director of manufacturing has a special staff with no executive authority engaged in the work of discovering new processes or machine tools or new ideas in shop management.

(Continued on page 11.)

Meet Our Members

R. J. WALTER

Ray Walter's technical training was received at the University of Michigan. He is broadly experienced in shop methods and his designing activities have brought him into contact with aeroplane design, automotive design, and the designing of special production machinery and tools.

Mr. Walter was formerly chief of special machine design for the Ford Motor Company, chief tool designer for the Hupp Motor Car Corporation and Assistant Chief Engineer for the Detroit Insulated Wire Company. At present Mr. Walter is Standards Engineer for the Ternstedt Manufacturing Company, Detroit.

Mr. Walter has served in a number of capacities for The Society. He was particularly active in establishing a branch of The Society in Flint, Michigan and served as Technical Editor of *The A.S.T.E Journal in* 1933.

Evolution of Organization

(Continued from page 10.)

Similarly the sales manager may have a staff which does no actual selling but is engaged in the work of sales promotion finding new outlets for the product.

One curious thing about an organization chart will be noticed on study, and that is that the man who does the actual processing or fabrication is not mentioned on the chart. Only the overhead is set up. A chart of this nature embracing everyone would be unwieldy and would not add anything to the definition of functions which is, after all, the true purpose of a chart. However, it is sometimes a good plan to have one master chart, and then have a number of local or subsidiary charts for each department clearly outlining the functions of each man. Such local charts have an important secondary reaction as they give the workmen a sense of pride in having a place in the company's personnel organization.

At one shop the writer visited in Dayton there was a simple tablet affixed to each man's machine tool or bench giving his name with the prefix Mr. attached. This practice unquestionably increased the pride and morale of the men in the establishment.

Just as there is competition at times for the individual of superior ability so there is competition for successful organization.

An organization which has demonstrated its ability to work together harmoniously and with accomplishment is desirable for many plants which show signs of weakness, trouble or decay. Some of our mergers have their actuating background in a desire to get a unified organization which will raise all plants in the merger up to a superior level. The organization thus becomes a working tool and should be considered as such. There are problems connected with its use and some of them will be considered later.

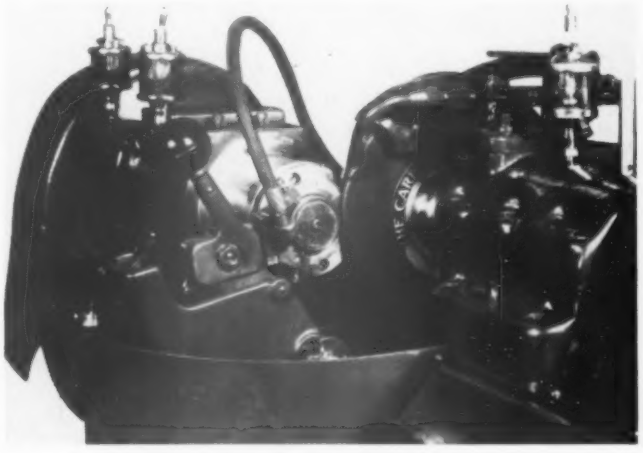
Landis Announces New 5" Hydraulic External Race Grinder

THE new Landis External Race Grinder is a companion machine to the recently announced 3½" Hydraulic Internal Race Grinder. Like the 3½" Internal, it has the capacity to grind all the smaller sizes up to and including the 218, 316 and 414 groups. Although originally used for single row races only, it may readily be utilized for double row races and thrust races. Larger sizes may be handled by removing the sizing device and certain other parts and operating it as a hand machine.

During grinding various machine movements take place automatically. These automatic movements are controlled from the progress of the grinding by the Landis-Solex Sizing Device. First, the operator places a ring on the chuck and starts work rotation. Immediately the work head starts oscillating and the wheel automatically rapid feeds into grinding contact with the race. The hydraulic feed mechanism then comes into play and feeds the wheel at a predetermined roughing rate.

When the work is rough ground to within about a thousandth of finish size (which amount is adjustable) the feed is automatically cut down to a very fine finishing rate. If desired, the coolant is automatically cut off at this point for a dry finishing operation. As soon as the race reaches finish size the wheel automatically backs away and work head oscillation stops. The operator stops work rotation, swings the sizing device back to its inoperative position and reloads.

The 5" Hydraulic External Race Grinder is designed and proportioned, with few exceptions, like the 3½" Hydraulic Internal Race Grinder. It will grind with as rapid a cut as the grinding wheel will stand up under and then finish very smoothly under a light feed, giving a remarkably quiet and chatter free race. The outstanding feature is the *Landis-Solex*



Close-up front view of the Landis Sizing Device in operating position. This new development is an outstanding feature of the new Landis Hydraulic External Race Grinder.

Sizing Device. It causes the machine to consistently produce raceways within limits of less than .0005"

(Continued on page 13.)

Double End Bore-Matic by Heald

(Continued from page 9.)

brake units. Boring speeds can be easily varied from 360 to 3270 R.P.M. by simply changing pulley sizes. The bridges are wide enough to take four of the No. 9 and No. 11 heads. The surfaces of these bridges are carefully scraped to a definite height within an extremely close tolerance from the surface of the table to assure alignment between the boring heads and the work holding fixture.

Accurately positioned locating buttons are provided on the surfaces of the bridges to serve as locating points for lining up the boring heads. Two transverse Tee slots are machined in the surface of the bridges to receive the clamping bolts of the boring heads. A Tee slot is machined in the end of the bridges to provide means for adjustment and the holding of one or more idler pulleys to take care of the slack in the boring head drive.

The distance between the bridges on the No. 46A is 33", the standard maximum table travel is 14". The boring stroke at one end of the machine may be as much as 8¼" but not more than a total of 13" on both ends on the standard machine with 33" between bridges. Provision has been made for mounting the bridges back for 2"—2¼" steps on each end to giving spacings up to 42", allowing considerably more room for fixtures or for room clearance when desired.

The clutch and brake units for starting and stopping the boring heads are of the direct hydraulic self-adjusting type. Direct acting oil pressure against the multiple disc clutch and brake plates automatically takes up all wear, provides ample lubrication and insures smooth starting and stopping.

Braking is maintained on heads when idle. This allows adjustment of the tools more readily, also allows jogging of the heads by hand manipulation of the clutch knob between "run" and "automatic."

The operating controls for the entire machine are located within a small radius on the front of the base. This includes motor start and stop buttons, table controls and boring head controls. The adjusting knobs for boring speed, facing speed, dwell and for hand control of boring heads are located at side of control assembly adjacent to the boring cycle and the heads they control. The main control unit is built up of separate units for the various functions, all mounted upon three flat plates, all connections between the different units being cored depressions in the surfaces of these matched plates. All mating surfaces on the plates and on the backs of the units are accurately surface ground so that no gaskets are necessary. This plate construction not only eliminates much piping in the base, but allows removal of any one of the various units for inspection or alteration without disturbing any of the piping, all piping remaining with the plates. Full advantage was taken of this ability to readily remove the individual units to make the control easily altered from one cycle of operations to another, with the least initial investment necessary to satisfy any particular cycle.

All passages and ports in the valves and plates are extremely generous in their dimensions, reducing heat due to friction of the oil and increasing the rapid traverse speed.

The transfer plate construction allowed a practically solid base wall supporting the front V way. The support of the plates on this base wall is concentrated well down from the ways to avoid transfer of heat expansion from plates to base.

Cams start the boring heads slightly in advance of the reduction to boring speed. Therefore, special cams may be made to jump gaps at high speed without any hesitation in boring head speed.

Landis New 5" Grinder

(Continued from page 11.)

because of the entire elimination of the human element. Scrap loss is so low as to be negligible.

Chatter free finish is the result of the use of hydraulic power and the elimination of vibration between the grinding wheel and the work by mounting both electric motors low on the bed. The rear drive motor is directly coupled to the oil and coolant pumps and is belted up to the wheel drive jackshaft. This jackshaft and all idlers are mounted on the bed in order that vibration will not be transmitted to the wheel base. Such a method of design insulates all rapidly rotating members from the wheel.

The hydraulically oscillated work head, the hydraulic wheel feed, the wheel base and carriage and the oil and coolant systems are completely pictured and described in catalog No. G-33 which covers the 3½" Hydraulic Internal Race Grinder. Operation of the Landis-Solex Sizing Device is based on the same principle on both machines. However, on the 5" External Machine a caliper frame mounted on a swinging arm is used instead of the diamond tipped finger arrangement referred to in the catalog. An air pump, driven by the main drive motor, is supplied to furnish air pressure for the sizing device on both the External and Internal Machines.

No one type of work holding chuck is considered standard on the External Race Grinder. The accompanying views show a magnetic chuck. In some instances the ring is held on a short arbor by means of a C washer. Other chucking means may also be employed. Because the grinding wheel on the External Machine is larger than on the Internal, the wheel spindle and bearings are more generously proportioned.

Net weight of the machine, without electrical equipment, is 3200 lbs. Floor space required is 45" x 60". Two 1750 RPM constant speed motors are used. The wheel and pump drive motor is 3 HP, the work drive motor ¾ HP.

NEW CUTTING METAL ANNOUNCED

Patents are pending, and formal announcement will be made shortly, of a new cutting metal by Willey's Carbide Tool Company of Detroit, Michigan. The new cutting metal is suitable for turning or working the following materials: cast iron, bronze, aluminum, rubber, brass, bakelite, babbitt, the tough metal of brake drums and nickel. The company states that extensive tests have been made by a number of large users, who have reported excellent results over a period of the last several years. A new plant has been acquired by the company, which is tooled up for the production of tips for particular requirements—or complete tools made to blue prints. Diamond impregnated laps for the lapping of hardened metals are also a new product of the company. F. H. Willey is President of the new organization.

Milling Manifolds One Of Rigidmil's Manifold Jobs

Included in the large number of jobs that Rigidmils are doing for industry is the milling of intake and exhaust manifolds for automobile motors. Sundstrand engineers have tooled hundreds of Rigidmils for this operation and have kept pace with the ever increasing demands for higher output at lower cost. This is no small achievement when the number of different shapes and sizes is considered together with their common characteristics of bulk combined with light weight.

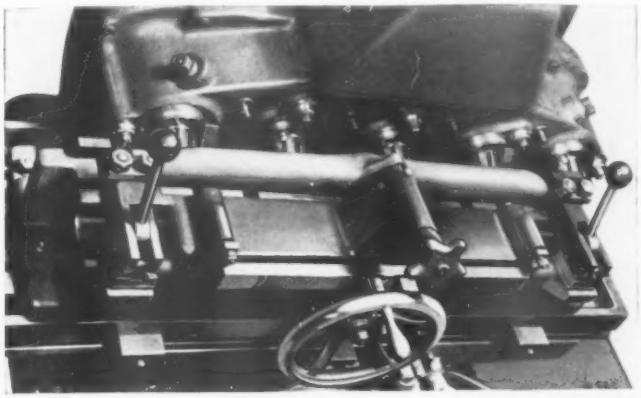


Fig. 1. Showing exhaust manifold clamped in position for milling five surfaces simultaneously.

Rigidmil adaptability facilitates the design of multiple spindle heads to machine the maximum number of surfaces that can be handled at one time with greatest economy. Sundstrand experience and ingenuity designs the fixtures for quick, accurate locating and clamping of the work-pieces coupled with solid support during machining.

An excellent example is shown in the accompanying illustrations of a Rigidmil and fixture for milling five surfaces on an exhaust manifold. Machine has automatic table control and the head has five horizontal spindles each with independent endwise micrometer adjustment. Fixture is heavy, has five locating pads, two spring-loaded work retainers, three clamps, and no less than nine work supports all of which are pressed lightly against the manifold and locked securely in position by the operation of one handwheel. As a result of this combination of features, this Rigidmil in commercial service is exceeding our production estimate and releasing about half of the operator's time for other work.

Sundstrand Engineered Production is at your service for developing applications of Rigidmils and Stub Lathes to a wide variety of milling and turning. Reliable proposals submitted promptly upon receipt of samples and data. Investigate—*today*.

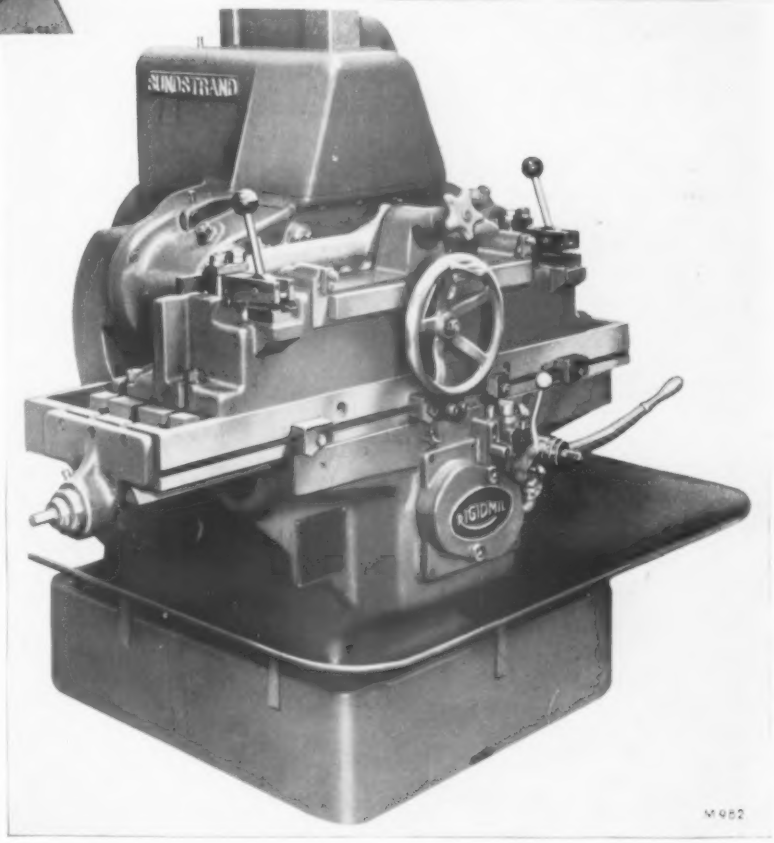


Fig. 2. Rigidmil with five-spindle head and fixture for milling exhaust manifolds.

35,000 NEW IDEAS EACH YEAR

Albert G. ("Gadget") Burns ☆

Sees or hears of most new creations

TO HAVE MOST of the new inventions of the Nation pass across one's desk in, either blue print or model form, is the unique position of Albert G. Burns of Oakland, California, President of the National Inventors Congress. It is said that Mr. Burns sees and hears of more new creations than any other living person in his capacity as president of that organization. Men and women everywhere send their patent problems to him for solution.

At the present time he is in Detroit arranging for a meeting of his group to be held in Detroit, October 9th to 12th, at the Hotel Tuller. An exhibit of New Inventions will be held in connection with the meeting.

An example of some of the things brought to this man's attention is best demonstrated by the announcement of a Minneapolis engineer offering $5,000.00 to the inventor who would produce a rain-making machine. Hundreds of letters, telegrams and messages were sent Burns suggesting various schemes for the development of a "Drought-Buster."

William M. Cloininger, 3137 View Street, Fort Worth, Texas, wired that he had an absolutely successful means of creating rainfall, but he would not divulge his secret until $20,000.00 had been deposited in a Fort Worth bank. Numerous alleged scientists, chemical and mechanical engineers offered the suggestion that radio affected the moisture supply, and recommended that the President proclaim a moratorium on radio broadcasting until such time as sufficient rain had fallen to meet the demands in all areas.

Others, both men and women alike, claimed super-natural powers to bring about rain. Some said they could command it to rain and it would rain. Several agreed that they could produce moisture at will and halt its flow through prayer. Needless to say in nearly every case, "Gadget" Burns was implored to do something on a national basis that would make one of these human "water works" a reality.

New Inventions Now More Plentiful

The past eighteen months has been the greatest period in all history for the development of new inventions according to Mr. Burns. Yet in 1848 the government contemplated closing the Patent Office because the best minds of the day had said that everything that could be invented had been. Inventions are in their infancy, and the entire social and economic solution to our present problems must evolve around new creations of the next ten years. There are really thousands of things that we know very little about, even though we are prone to consider ourselves the most advanced nation in the world.

One of the outstanding demands is for cold light. The electric light in use today rarely has an efficiency above 8%. Ninety-two per cent or more of the electrical energy fed to electric lights is dissipated in the form of useless heat. We need a new idea that will reverse this situation.

There are really hundreds of items that are needed that inventors can make money on. Here are just a few:

(1) Recording speech directly to a piece of paper without the aid of a stenographer. This is believed to be practical and a number of laboratories are working along these lines. One particular institution claims that it will make an announcement regarding this discovery within the next sixty days.

(2) A wall paper machine that can be successfully operated in the hands of an amateur will command attention of thousands of home owners.

(3) If you have an idea about an automatic window closer you might make some quick money. A certain manufacturer is interested in securing a device that will close the window at a predetermined hour so that the room will be warm when the occupant arises or when a person is returning home after an evening out.

(4) How to prevent electrolysis? That is a question that concerns many engineers who seem to be practically helpless in preventing damage to water mains and gas pipes, as well as the underground portion of steel buildings from being greatly damaged when in the vicinity of street railways. There is a certain amount of electric current which leaks from the rails through the conducting earth and causes electrolytic dissociation.

ALBERT G. BURNS
President, National Inventors Congress

(5) Some of these days some one will produce an electro-magnetic gun that will discharge at high velocity even small projecticles that will be noiseless in operation and therefore difficult to detect.

(6) A hot one—an electric burglar alarm with a thermo-couple so sensitive that it would be operated by the heat from a human body when it came within a few feet of it.

(7) A machine that will automatically weigh and place the amount of postage due on mail.

(8) Now that the death ray is a reality several electrical engineers are working on a paralyzing ray which will put out of commission electrical apparatus with magnetos and high voltage coils. Such a device would be of tremendous value during war time, inasmuch as gasoline operated engines could be made inoperative by it.

(9) There is a much needed method of preventing disturbance in telephone and telegraph lines due to the magnetic disturbance in the earth, which is usually caused by auroral displays.

(10) Ships traveling in the Arctic zones are in great need of a sensitive device that will detect the changes in temperature in the water, and ring an alarm when the ship approaches an iceberg.

(11) A reversible propeller that is simple in construction that can be used in small boats is much needed.

(12) How to prevent exhaust smoke is a real problem. Some method should be found of precipitating exhaust smoke so that it will not reach the street.

(13) Storage batteries are constantly in need of distilled water to replace the water that has evaporated. If this water could be automatically admitted from a reservoir on the battery itself—time and trouble could be saved.

(14) A means of producing puncture proof tires by inserting some kind of a metallic fabric between the surface and the inner tube. Puncture proof mufflers are also needed. Mufflers are often punctured by the explosion of gases that accumulate within them.

(15) Electric railways which use third rails have a perplexing problem in preventing ice from forming on the third rail. A mechanical method of preventing this ice is very much needed.

Putnam Tool Company Organized. Frank J. Nefske and Ernest C. Putnam, well known to A.S.T.E. members, announce a new company to be located at 2981 Charlevoix Avenue, Detroit. They will manufacture standard and high speed Double-end End Mills and a general line of special and standard cutting tools.

POSITION WANTED

Designer, Tool maker, (33) would like to connect with small or large shop to do designing and tool making. Five years drafting and designing, 10 years shop and foremanship. Edw. Nabb, 8021 Woodrow Wilson, Detroit, Mich.

IT COULD ONLY HAPPEN TO A SWEDE

Larson's Luck

The incident told here happened, substantially, as related. If it hadn't happened at all—it easily could have, as Mark Twain once stated,—and if "Larry", whom many A.S.T.E. readers know, should chance to read this, let it be a reminder to pay back the ten "bucks" he borrowed from me back in '14.

★ **Anders Jannson**
A.S.T.E. Member

IT happened, among other things, during the war. Larry Larson was then chief cook and bottle washer for the E & F Machine Company, which is to say that he was chief draftsman, estimator, production man and what not of a not so big nor so small jobbing shop. The American Society of Tool Engineers had not yet dignified his vocation by calling him a tool engineer.

By the way, his name wasn't Larry Larson but we'll call him that, since only to one of his race would have befallen the good fortune to so opportunely extricate himself from the dilemma into which he had unwittingly placed himself. Now that time, place and characters are settled, let's go on with the story. There are characters—for Larry had a wife—and that makes two to figure in this narrative.

The shop was doing well, when Uncle Sam suddenly decided to crack down on non essentials, which meant try and get material unless it was for war purposes. So, Larry was ordered to dig up some war work. He did. In due time came a roll of blue prints, and Larry buckled down to estimating. Christmas eve he left his wife waiting for Santa Claus by herself while he pored over his estimates. The New Year's party went the same way. Another roll of prints came along just before Decoration day, and smoldering revolt flared up in friend wife when he spread them out on the dining room table.

"Can't you work on those things during the day?" she enquired.

"The day isn't long enough." was the weary reply. "Got plenty of coffee?"

"All you want to cook. I'm going over to my Mother. And say, Fourth of July is coming. If you come home with another load of prints the night before I'll—I'll *stay* at mother's."

"My pal. When a guy works his head off for his wife—"

"Some other man may want to take her out playing. Oh, don't look that way—nobody's asked me. But it's happened to others."

"Yeh, I know how you feel. Okay. Forgive me this time, and there'll be a hot time the Fourth."

That was that, and Larry bent over the prints. Carefully he went over each part; cost of patterns so much, manufacturing time so much, tools so much. Sketched out fixtures and routed operations. Came the last print, in the wee hours.

"Ummm. Only a hundred pieces, and almost the same thing as those other frames. Darn those government designers anyway—why do they want decimals on a lug sticking out in the open air. Well, that'll cost 'em an extra dollar each. Call it ten "bucks" apiece for manufacture, and three hundred for tools."

So Larry turned in his bid, including the frames at $13.00 each. The frames were A shaped, about 12″ high and some 8″ at the base, with numerous holes at close limits. He was to remember that item.

A few weeks went by, and Larry beat his competitors to the order. Felt quite pleased with himself as he turned his sketches over to the draftsmen and got ready for production. The Fourth of July approached, and, the day before, his car was gassed, greased and polished for the big Knights o' the Hot Sands picnic. The wife wasn't going to be cheated *this* time.

And then.

"Say, Larry," it was his pet tool designer. "I see you have a note here for Frank Goodwin, on making the pattern for this frame. Only, it's a drop forging."

"A drop forging!" blankly. Then, Larry looked at the print. Now, did you ever have that smug feeling that you had turned out a fool proof job, and were just looking for the boss to pat you on the back, and then have some one point out that it was okay except that it wouldn't work. Then you know how Larry felt.

"Wait a minute." He was perspiring, plenty, as he left the room. He was back soon. "You know, I took some Coscarets last night, and—" "Yeh," sympathized the draftsman. I've had it happen to me, too. Well, what are we going to do?"

"Well, maybe, *you* know how I can get out of this jam." Omigosh! The dies alone for that job'll cost plenty. Go on!—do something else and leave me to my misery."

The rest of the afternoon whizzed by in a futile attempt to beat down adamant diemakers. "Fifteen hundred for those dies! It's highway robbery."

"Well, I'd rather rob you than myself." the lowest bidder retorted. "Tough luck, Larry. Why don't you enlist before the boss gets wise?"

"They turned me down. Flat feet, you know. Flat *feet*—gosh! They must have examined me upside down. You won't take ten hundred?"

"Not the day before the Fourth. Better get drunk, Larry." Larry did.

"Well, do you think you can drive the car?" asked Mrs. Larson, next forenoon. "And don't think about running out of gas. Just blow into the magneto, or whatever the gas tank is hooked to." And so on— — —.

Larry steered a wobbly course on the way to the picnic, and finally settled down to a steady gait once the streets straightened out. His route took him past the freight yards, and near there his engine acted up.

"Well, just breathe on it, like I told you," his back seat driver suggested.

"No I won't shut up! I——oh!"

The interruption was caused by a truck which rumbled past, it's load jangling and clanking. Something heaved into the air as it lurched from a hole in the pavement, and bounced with a metallic clang right into the open hood of Larry's car. Simultaneously he let out a startled yell.

"Hi, wait a minute!" But the truck turned a corner nearly a block away. Larry raced after it—came running back. He was cold sober. Frantically he spun the crank——and, the engine started. Then followed a ride which Mrs. Larson wasn't soon to forget. Around corners on two wheels, stopping with a jerk at an intersection, whang! into reverse. Around the block—almost knocking down an up-to-then considerate traffic cop.

"Larry, are you crazy?" his wife demanded. "Look, that cop is chasing us in another car."

"Jump out and fall in the road," Larry yelled. "That'll slow him up. Goshamighty, *where* did that truck go? Ah! It was an exclamation of triumph.

The cop ran down his quarry at the loading platform of the freight station, and advanced gloatingly. Larry turned impatiently from the grinning husky who was unloading drop forgings.

"Go away," he waved. "Here!" extending his bill fold. My license is in there. Write me up for anything. It's okay now. Yep, it's okay now."

"Sez you? D'ye know you almost ran over my feet?"

"Do you call them feet? But here!" retrieving the bill fold. "Here's some plaster for 'em. No, Buddy, it's no bribe—turn it over to the fund if you wish."

"We-ell?" in mollified tones. "But what the divil ailed ye, man?"

"Perhaps a rabbit's foot touched me. Anyway, you wouldn't understand. You're Irish."

The next morning Larry whistled blithely as he cleared his desk of assorted gears, gadgets and hickeys by the simple expedient of sweeping them to the floor. "Pick 'em up, Eddie." to the office boy. Then, reminiscently, "Gosh, that was a swell picnic yesterday. Oh, hullo, Bill," to his pet tool designer.

"All's well with the world, I see." surmised the latter. "Will it spoil your good spirits if I mildly enquire about those A frames?"

"No. The forgings'll be here during the week. You know how it is." He grinned at Bill's dubious back as the latter went back to his board. "Say, am I lucky!" Larry congratulated himself. "Imagine having that forging dumped into my lap, almost, like that, and then running down the name and address of the forging shop. And seventy cents apiece for the forgings! I couldn't have had patterns and castings made for that—if they had been castings. But Larry, you flathead, don't ever let it happen again. But then, it couldn't."

"The New Industrial Abrasive Wheel Dresser" is the title of a new catalog just issued by the Industrial Diamond Company of Detroit. A complete description of diamond dressing is given, as well as a description of various types of mechanical dressing tools for all types of grinders.

The company's Type 98, their latest development, is a universal low-priced dresser and consists of a number of diamonds fused into "Diamite," the company's new tungston-carbide metal. This new tool will entirely eliminate re-setting of diamonds.

This Month's Cover

The photograph on this month's cover, while a prize winning example of the photographer's art, is—simply—a reproduction of an exhaust valve. But the method used to produce this valve is so unusual that The A.S.T.E. Journal deemed it of sufficient interest to warrant the prominent display it has been given.

From a seven eights slug, about one inch long, of Silchrome Steel, this valve is extruded. The method was originally developed in Europe and has required several years to perfect the process here. The operations are few in number and comparatively simple.

Operation 1a. The slug, having been heated to a temperature of 2250° is placed across the die—*not flat.* A medium sized press is used for extruding this slug into form with the stem about one half to five eights longer than required length.

Operation 1b. The extruded valve, from operation 1a, is now placed in a second die, the purpose of which is to finish-coin the head including the seat surface. This is accomplished with the same stroke of the press as in the first operation. The valve is still at a considerable temperature for both of these operations.

Operation 2. About four fifths of the stem is heated to a bright cherry red for this operation. Four stems are heated at once and a Berwick Electric Furnace has been used for this purpose. On a press, with a combination tool, the stem is sheared off to the proper length and the oblong hole for the spring retainer pin is pierced, at the same time.

Operation 3. In this operation, the heat from the last operation is utilized, while the stem is rolled in a Waterbury thread roller, having blunt dies. This operation straightens the stems and produces almost perfect concentricity with the head.

All that remains to complete the valve, now—of course—is grinding. An advantage of the entire method appears to be the elimination of stock removal and the unusually fine flow of the metal of this valve. Much credit should be given to the grinding machine manufacturers, whose hearty cooperation has made possible the success of this method.

LANGLOIS *announces* SPRAY METAL *for* SALVAGE PURPOSES

●

LANGLOIS, pioneer in salvaging gages, announces metal spraying for economical and satisfactory reclaiming of various machine parts.

Bearing surfaces so treated will save costly replacements of the parts salvaged as well as the bearings. The wearing life is greatly increased, which assures a double saving—in replacement of parts and in longer lived performance.

Centerless Grinder Spindle, shown above, after spraying. Below, same spindle finish ground.

●

LANGLOIS GRINDING COMPANY

Precision Gage Makers — *Pioneers in Chrome-Plated Gages*

DETROIT, — MICHIGAN